ture by the Federal Reserve Banks for office buildings and vaults for branches is necessary in order to conduct the work properly.

It is not improbable that in the future development and progress of the Federal Reserve System, there will arise the necessity for the location of other branches to meet the demands or requirements of business communities or industrial centers. These situations will be met and provided for and any additional functions which may be properly assumed by the Federal Reserve Banks will likewise be allotted to the branches.

Curves of Expansion and Contraction, 1919–1921

By A. C. MILLER
Federal Reserve Board, Washington, D. C.

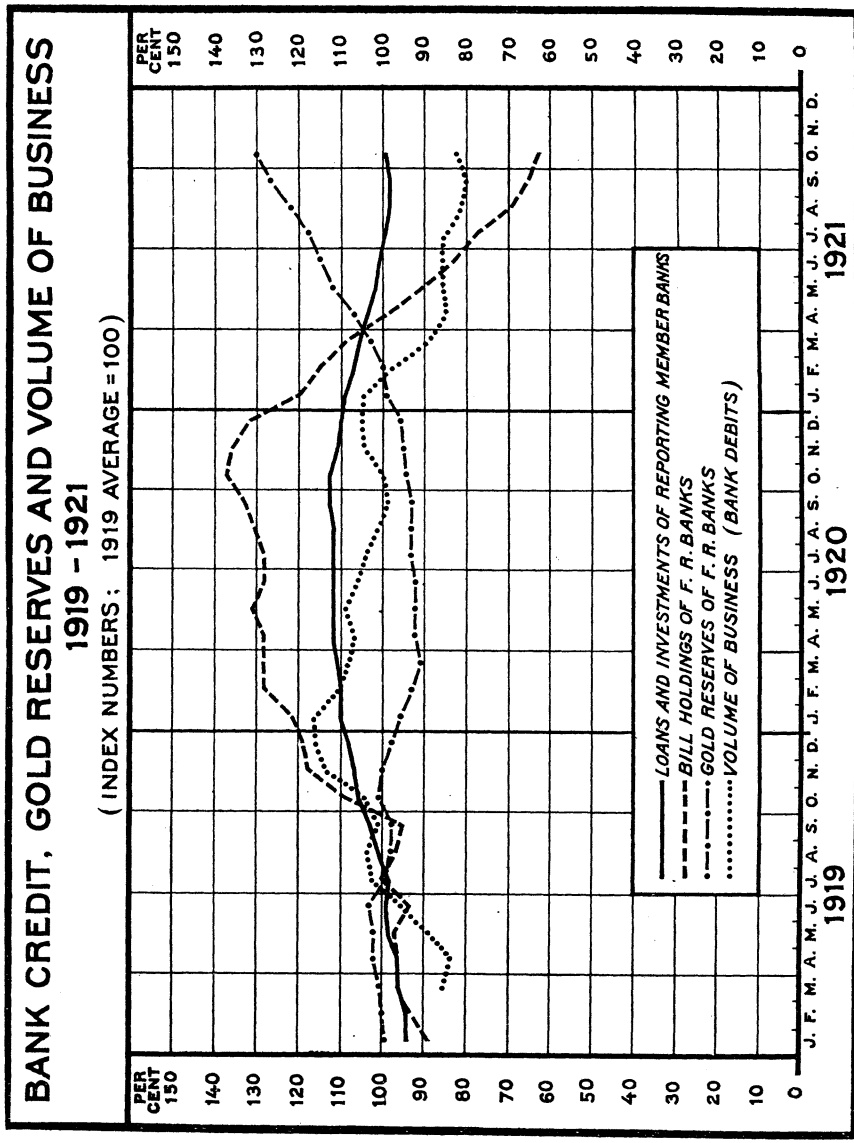
THE economic vicissitudes through which the country has passed during the past year have brought to everyone a vivid and memorable experience of the actualities of expansion and contraction and have made the study of the conditions which eventuate in these violent alternations of the curves of business and credit, a matter of profound practical importance.

War, and its immediate aftermath of business inflations, made the credit expansion. After-war readjustment, with its inevitable liquidation, has made the credit contraction. So much is already clear from the outside point of view and is now admitted by most fair-minded people. But what is further revealed and how does the matter look when the operations of the banking system are viewed from the nearby, or Federal Reserve, point of view? For this whole recent experience raises some questions of great moment with regard to the functioning of the country's new credit mechanism.

It is not the purpose of this discussion to go into the economics of the expansion and contraction of 1919–1921. It is not at all concerned with questions of economic causation. No attempt will be made to determine whether expansion or contraction of credit caused expansion or contraction of business and the rise and fall of prices, or whether the movement of credit was determined by the movements of business and prices. The correlation of the business and financial factors involved in the economic developments of the past three years presents too complex a problem to be undertaken within the limits of this paper. For the assistance of any who are ambitious to penetrate the economic mysteries of recent expansion and contraction, there is, nevertheless, appended to this article a collection of data covering most of the determinable factors involved in the problem. In order to make the fluctuations in the different items comparable, they are expressed in the form of index numbers based on the 1919 average. A second table shows the absolute figures upon which the index numbers of banking are based.

MEASUREMENT OF EXPANSION AND CONTRACTION

The object of the present discussion is to ascertain what light recent experience throws on the question as to whether the Reserve System possesses a sensitive and accurate indicator of changes in the credit and business



situation—or, let us say, of expansion and contraction.

The above chart brings out the essential developments for this purpose. The two curves of credit on the chart show, respectively, changes in the bill holdings of the Federal Reserve Banks and changes in the loans and investments of the reporting member banks.[1] The third curve shows changes in the gold holdings of the Federal Reserve Banks, and the fourth,

[1] Consisting of some 800 of the largest banks of the country which report weekly to the Federal Reserve Board. These banks represent about 40 per cent of the banking resources of the country, and changes in their condition may be taken as typical of changes in the banking situation in general.

changes in the volume of the country's business.[2]

The volume of business in general depends on four factors, or, in mathematical language, is a function of four variables: (1) physical volume of production; (2) price level; (3) activity of trade (rapidity of turnover); and (4) speculative and other transactions in securities, exchange, etc. A change in any one of these factors affects the total volume of business, and this, in turn, affects the total volume of credit required. In any exhaustive analysis of the business or economic situation to ascertain what factors are affecting the demand for credit facilities, or, let us say, the expansion or contraction of credit, careful attention must always, of course, be given to variations in any of the elements affecting the volume of business.

CHANGES IN THE BUSINESS SITUATION, 1919–1920

Beginning about midyear, 1919, and extending to the end of the year, there was a pronounced expansion of business accompanied by great speculative activity involving commodities as well as securities. Increased activity of business (rapidity of turnover) and rise of prices were the important factors in this development. The index of the physical volume of production (for manufactures) shows no noteworthy change during this interval.

Economic reaction set in early in 1920, and continued throughout the year. Business recession was much in evidence and gained in momentum after mid-summer, 1920. In the first quarter of 1921 the reaction reached the stage of acute liquidation. Thereafter business pursued a steadier course. This period of reaction and liquidation was marked by diminished physical volume of production (for manufactures) after mid-summer, 1920, and by the drop of wholesale prices. The index for manufactures declined from 102.3 in July to 77.9 in December, 1920, and to 68.5 in July, 1921. The price index declined from 123.6 in July to 89.2 in December, 1920, and 69.8 in July, 1921. These changes in the business situation, 1919–1921—that is, the rise and the fall in the volume of business transactions—are clearly reflected in the curve of business. Its trends are unmistakable.

How well are these changes in the business situation—in brief, the expansion and contraction of the volume of business—reflected in the curves of credit, first, that of the member banks, and second, that of the Federal Reserve Banks?

MEMBER BANK CREDIT CURVE OF EXPANSION AND CONTRACTION

The member bank credit curve reflects pretty faithfully the business expansion which went on in the second half of the year 1919, and again, the liquidation which was in process in the early part of the year 1921. It will be noticed that the liquidation of the loan account of the reporting member banks in the first six months of the year 1921 approximately cancels the expansion of the loan account of these banks in the second six months of the year 1919. Through the year 1920, however, it will be noticed that the curve of credit of the member banks shows a different trend from the curve of business. The business recession which was in process

[2] As measured by debits to individual accounts in banks in about 150 leading clearing-house centers. In order to eliminate short-time fluctuations due to the difference in the number of business days in a month, to mid-month and end of the month payments, and to Treasury operations in connection with the quarterly installment of income taxes, the volume of business curve on the chart has been smoothed by means of a moving average which shows for each month the average volume of business for the month and the two preceding months.

in 1920 is not at all reflected in the member bank curve of credit. There was no contraction of credit until the last quarter of the year. On the contrary, the banks were expanding their accommodation throughout the year and until after the crop-moving season was over. Agriculture was in distress, while business was in the midst of the crisis of readjustment and needed assistance in effecting the transition from the period of expansion through the period of liquidation. That assistance was being extended by the banks, as both of the curves of credit clearly indicate, and thus was liquidation of business moderated and kept orderly by comparison with what it would have been, had it not been for the steadying and easing influence of our new credit machinery.

THE RESERVE BANK CURVE OF CREDIT

Turning to the Reserve Bank curve of credit, it appears that the curve of credit of the Federal Reserve Banks parallels the curve of business more closely than does the curve of credit of the member banks, both in the period of rapid expansion in 1919 and in the period of acute liquidation in 1921. It will be noticed on the chart that the Reserve Bank curve of credit in the period under review twice cuts through the member bank curve of credit—once in October, 1919, on the upward swing of business, and again in April, 1921, on the downward swing of business. By comparison with the member bank curve, the ascent of the Reserve Bank curve was more pronounced on the rise, as was also its descent on the fall. On the other hand, throughout nearly the whole of 1920, when the business curve was showing a decided downward trend (until the last quarter, when a slight rise is shown due to seasonal influences) the Reserve Bank curve of credit showed an opposite, or upward, trend. Both curves of credit in the critical year 1920, therefore, followed a different trend from the curve of business, but it is noteworthy that the difference is much more pronounced in the Reserve Banks' curve than in the member banks' curve.

THE GOLD INFLUX AND RESERVE BANK CREDIT CURVE

There still remains to be considered the curve of gold reserves. The sharp and prolonged drop in the Reserve Bank curve of credit through the year 1921 and the liquidation which it reflects cannot be understood without reference to the great influx of gold into the country and into the Federal Reserve Banks, which has been in process during the past twelve months. Reference to the chart brings out the opposite movements in these two significant and related curves. Reference to the index numbers shows that the index of the Federal Reserve System's gold holdings rose from 94 in October, 1920, to 130 in October, 1921, while the index of bill holdings declined from 137 in October, 1920, to 63 in October, 1921. Over 45 per cent of the liquidation of the loan account of the Federal Reserve System, it appears, may be attributed to the increase of its gold holdings. The influence to be attributed to the gold factor in Federal Reserve Bank liquidation is still greater in the case of the Federal Reserve Bank of New York, which has been the chief recipient of the gold flowing from Europe to our shores. The index of bill holdings for that bank fell from 126 in October, 1920, to 37 in October, 1921. Its gold index for the same period shows a rise from 74 to 156. The gold factor is thus seen to account for over 73 per cent of the liquidation experienced by the loan account of the Federal Reserve Bank of New York.

The great stream of gold which has

poured into the United States from Europe during the past year has come in liquidation of foreign indebtedness to us, and has been turned over by member banks to the Federal Reserve Banks in liquidation of their own indebtedness. The pronounced and continuous downward trend of the Reserve Bank loan curve during the past year is therefore seen to be due largely to foreign liquidation. The course of business shows considerable steadiness after the first quarter of 1921, and the member bank curve of credit, after the second quarter; but the Reserve Bank curve of credit continues its downward course in 1921 without abatement in quick and close response to the continuously upward course of the curve of gold reserves. As an indicator of the degree and rapidity of domestic liquidation, the Reserve Bank curve of credit is misleading, owing to the disturbing influence of the gold factor.

THE RESERVE BANK CURVE OF CREDIT THE MORE SENSITIVE INDICATOR OF CREDIT CHANGE

Comparing the two curves of credit with one another, it is clear that while both curves are influenced by the same changes in the business situation, their response is not the same. A glance at the chart brings out the fact that the Reserve Bank curve moves very much more readily and markedly than the member bank curve. The member bank curve appears flat by comparison with the Reserve Bank curve, and gives a less lively impression of the business and credit developments and changes which were in process. What is the explanation of the difference, and which of the two curves is the better index of expansion and contraction?

The relative flatness of the member bank credit curve during the year 1920 as compared with the Reserve Bank curve is due to several circumstances, some transitory in character. It will be recalled that the loan and investment account of the banks of the country was greatly swollen during the War by heavy investments in Liberty bonds and Certificates of Indebtedness, and by accomodation granted subscribers to government war loan issues. After the War, the process was reversed. There has been constant liquidation of bank holdings of government securities and of loans collateraled by such securities. Reporting member banks' holdings of government securities dropped from 3,083 millions in May, 1919, to 1,938 millions in January, 1920, and 1,318 millions in January, 1921. Figures of holdings of paper secured by government securities are not available until December, 1919, when they amounted to 1,337 millions. From this point they declined to 899 millions in December, 1920, and 577 millions in October, 1921. The liquidation in the loan and investment account of the member banks from these sources has therefore been very considerable. But it does not appear to be reflected in the movement of the member bank curve of credit in 1920. That curve was ascending in spite of liquidation from these sources. But had it not been for this liquidation, it is altogether reasonable to assume that it would have ascended still more. The credit thus released by liquidation of war loan securities and paper was apparently being used to expand the commercial and speculative loan accounts of the banks.[3]

[3] Something similar occurred in the early autumn of 1919, when it will be noticed the member bank curve was rising, while the Reserve curve was declining, the banking expansion then in process being able to proceed without increased borrowings from Federal Reserve Banks. This is explained by the fact that the floating debt of the government was reduced at this time by almost 500 millions of dollars, the banks using the funds thus made available to them for the expansion of their commercial loans,

When we come to the period of liquidation in the autumn of 1920 and the following winter, there appeared an influence of an opposite character to that just described—namely, the so-called "frozen credit." By "frozen credit" is meant credit that has continued its existence beyond the time when the transactions which gave rise to the credit should normally have liquidated themselves. It is made up of credits which have not been liquidated because the transactions underlying the credits have not been able to run their course and liquidate themselves. It is well known that large volumes of goods produced last year have been carried by the producers for lack of satisfactory markets. Prices were falling, markets were collapsing, and there was congestion of goods at points of primary production and distribution. The owners of these goods had to be "carried." There is no means of approximating the amount of these frozen credits, but there is reason to believe that they constitute a very substantial fraction of the total loans and discounts carried by the commercial banks of the country.

The member bank loan curve shows resistance to the forces of liquidation. It was this retarded or "orderly" liquidation which kept the curve from descending as swiftly as it otherwise would have if it had been influenced merely by the volume of current business transactions. Moreover, the liquidating power of a dollar paid in by a member bank to its Reserve Bank in a period of liquidation appears, on the basis of the past two years, to be very much less than the credit-supporting power of a dollar loaned by a Federal Reserve Bank to a member bank in a period of active expansion.[4] And furthermore, the Federal Reserve Bank loan curve, as has already been pointed out, represents in a peculiar degree the liquidating effect on the Federal Reserve loan account of the huge influx of gold which has been continuous during the past twelve months. Besides these transitory influences which have helped to give the member bank loan curve a relatively flat character, there is the additional important and regular influence exercised by the far greater volume of member bank loans compared with Reserve Bank loans. Owing to the fact that the base figure is much larger for member banks than for Reserve Banks, the same change in absolute amounts will result in a much larger percentage change and, consequently, in a much steeper movement in a Reserve Bank curve than in a member bank curve. But this arithmetical fact does not fully explain the discrepancy. There is a further reason of an economic character to be noted in a study of the curves of expansion and contraction.

The great bulk of the loans of the member banks at any time represents loans incident to the ordinary volume and requirements of business, and

[4] During the period of expansion between 1919 and 1920 (dates for which information is available being June 27, 1919, June 25, 1920, and June 29, 1921) the increase in the loans of the member banks was 6.7 times as great as the increase in the discounts of the Federal Reserve Banks, while during the following year the decrease in the loans was only 2.3 times as large as the decrease in Federal Reserve Bank discounts. For the reporting member banks, for which data on more significant dates are available (July 25, 1919, before the speculative expansion began, October 15, 1920, when the peak was reached, and November 2, 1921, the latest date for which data are available) their investment and loan account increased 3.2 times as fast during the period of expansion as their borrowings from the Federal Reserve Banks, while during the period of liquidation the reduction in the investment and loan account of the reporting member banks is 1.6 times as large as the corresponding reduction in their borrowings from Federal Reserve Banks.

exercises, even in times of marked changes in the business situation, a steadying influence on the member bank credit curve. The situation of the Reserve Banks is different. Their loan account does not reflect the normal volume of credit in use. Under normal conditions, their operations are not large. It is not the absolute amount of credit in use, but the ebb and flow of credit, which affects the loan account of the Federal Reserve Bank. The Federal Reserve Bank has little part in the ordinary credit business of the country. It does not deal with business borrowers directly. The relations of the business man are with his member bank, the member bank in turn dealing with the Reserve Bank as occasion may necessitate. The Federal Reserve loan is not the first line of credit, but the second line of credit. The expansion and contraction of the Reserve Bank loan account are twice removed from the expansion and contraction of the volume of business as reflected in commercial bank loans.

The Federal Reserve is called into activity when the supply of ordinary credit facilities is inadequate. It supplements the resources of its members. It is, so to speak, the increments and decrements in the country's credit requirements that are reflected in the upward and downward movement of the Federal Reserve loan account. It is when business is speeding up beyond their normal credit capacity that the commercial banks must resort to the Federal Reserve Banks for accommodation. When business is receding and liquidating in a period of economic reaction, slackening of credit requirements will result in a marked reduction of borrowings from Federal Reserve Banks. The Reserve Bank curve consequently reflects movement, change —the *more* or *less* of credit required— and not the actual total volume of credit in use by business. On a relative basis the Reserve Bank curve has a tendency to magnify what is in process in times either of rapid expansion or of acute liquidation; in other words, to give an exaggerated or heightened impression of these movements.

A GUIDE TO CREDIT POLICY

Therein consists its importance as an administrative guide. While it may be faulty as a gauge of the degree of credit expansion or contraction, its very sensitiveness gives it a peculiar value as a quick indicator of what changes in the business and credit situation are in process or even impending. For while the Reserve Bank curve, during the period under review, has been over sensitive and gives an exaggerated impression of credit developments, the member bank curve, for reasons already discussed and primarily because, at any moment, it is more influenced by what has taken place than by what is taking place, tends to give an inadequate impression of changes which are in process, at least so far as they affect the credit situation. In times of rapid expansion or contraction, it is not the total volume of outstanding bank loans which is significant, but additions to that volume, or reductions in it. From this point of view, the Reserve Bank curve is a truer index of business and credit development than the member bank curve, and a better guide to credit policy.

INDEX NUMBERS OF BANKING AND BUSINESS DEVELOPMENTS: 1919–1921

(Monthly averages for 1919 = 100)

	All Federal Reserve Banks			F. R. Bank of New York			Reporting Member Banks					
	Bill holdings	*Gold reserves*	*F. R. note circulation*	*Bill holdings*	*Gold reserves*	*F. R. note circulation*	*Loans and investments* [a]	*Net demand deposits*	*Accommodation at F. R. Banks*	*Volume of business* [b]	*Wholesale price index* [c]	*Volume of manufacture* [d]
1919												
January..	89	99	97	94	95	92	94	95	88	....	95.8	101.6
February.	93	100	95	100	92	90	94	94	94	....	92.9	86.7
March...	96	101	96	97	105	96	96	95	98	85.6	94.8	92.6
April	96	102	98	93	115	100	96	96	97	83.3	95.8	93.7
May	97	102	97	98	112	101	98	99	101	88.7	97.6	95.7
June	93	103	96	89	119	100	99	98	92	95.1	97.6	95.9
July.....	100	99	97	106	98	102	98	100	98	102.5	103.3	101.9
August ..	97	98	98	98	94	102	101	102	94	103.4	106.6	107.2
September	95	98	101	89	94	102	103	104	93	101.2	103.8	103.8
October..	109	101	105	109	91	103	106	105	112	104.6	105.2	104.4
November	118	100	108	114	94	104	107	107	119	113.5	108.5	102.2
December	119	98	113	114	91	108	108	106	117	116.4	112.3	102.1
1920												
January..	122	96	111	119	87	105	110	109	121	116.7	117.0	115.9
February.	128	93	114	126	83	110	110	108	136	111.0	117.5	104.6
March...	128	91	117	123	77	113	111	109	138	108.4	119.3	118.0
April	128	92	118	117	86	114	112	109	139	107.1	125.0	108.8
May	131	92	119	122	86	115	112	109	140	108.6	128.3	111.8
June.....	128	92	119	120	84	116	112	109	133	106.9	126.9	109.6
July.....	128	93	121	122	81	117	112	108	135	103.6	123.6	102.3
August ..	131	93	122	125	75	116	112	107	139	101.2	117.9	104.9
September	133	93	126	118	76	117	113	107	142	98.4	114.2	101.4
October..	137	94	128	126	74	119	113	106	150	100.3	106.1	101.2
November	136	95	128	125	74	119	111	104	148	104.3	97.6	88.9
December	132	96	128	124	71	118	110	102	143	104.6	89.2	77.9
1921												
January..	120	99	121	116	65	109	109	102	131	104.7	83.5	78.3
February.	115	100	117	114	64	108	107	100	126	98.2	78.8	75.0
March...	109	103	115	102	78	108	106	98	121	90.1	76.4	80.6
April	100	107	110	84	101	104	104	96	108	85.0	72.6	75.8
May	91	112	107	75	106	98	102	96	96	85.9	71.2	79.3
June	83	115	103	59	128	94	101	96	85	85.9	69.8	75.9
July.....	78	118	100	53	132	89	99	95	79	85.2	69.8	68.5
August ..	70	122	96	49	134	87	98	94	67	81.6	71.7	....
September	66	127	95	39	150	87	98	94	61	80.2	71.7	....
October..	63	130	94	37	156	86	99	95	57	82.3	....	....

[a] Including rediscounts with Federal Reserve banks.

[b] As measured by debits to individual accounts, three-months' moving averages.

[c] U. S. Bureau of Labor Statistics.

[d] Harvard Committee on Economic Research.

BANKING DATA: 1919–1921

(Monthly averages: amounts in millions of dollars)

	All Federal Reserve Banks			F. R. Bank of New York			Reporting Member Banks			*Ratio of F. R. accommodation to total loans and investments (per cent)*
	Bill holdings	*Gold reserves*	*F. R. note circulation*	*Bill holdings*	*Gold reserves*	*F. R. note circulation*	*Loans and investments* [a]	*Net demand deposits*	*Accommodation at F. R. Banks*	
1919										
January	1,992	2,100	2,534	757	611	676	14,178	10,048	1,306	9
February	2,084	2,119	2,465	804	593	665	14,257	9,908	1,400	10
March	2,147	2,138	2,506	780	677	709	14,578	10,115	1,449	10
April	2,138	2,156	2,547	751	740	738	14,559	10,135	1,443	10
May	2,168	2,177	2,532	795	721	743	14,886	10,439	1,497	10
June	2,089	2,177	2,500	721	765	736	14,969	10,393	1,361	9
July	2,241	2,112	2,527	852	632	749	14,813	10,604	1,454	10
August	2,174	2,079	2,543	789	602	748	15,204	10,800	1,395	9
September	2,136	2,086	2,627	718	605	753	15,577	10,984	1,383	9
October	2,436	2,136	2,742	883	587	756	15,961	11,140	1,660	10
November	2,633	2,116	2,821	923	607	761	16,143	11,330	1,765	11
December	2,661	2,089	2,959	921	587	796	16,337	11,244	1,739	11
1920										
January	2,720	2,037	2,892	963	557	775	16,670	11,576	1,803	11
February	2,867	1,979	2,962	1,018	535	810	16,630	11,482	2,019	12
March	2,856	1,936	3,041	997	498	834	16,813	11,600	2,053	12
April	2,853	1,950	3,075	949	552	838	16,935	11,546	2,069	12
May	2,934	1,943	3,092	981	555	848	16,941	11,506	2,085	12
June	2,857	1,964	3,115	968	538	857	16,926	11,499	1,981	12
July	2,875	1,975	3,145	985	518	860	16,876	11,466	2,005	12
August	2,933	1,974	3,172	1,006	483	854	16,862	11,299	2,072	12
September	2,973	1,975	3,277	956	490	862	17,012	11,286	2,117	12
October	3,071	1,998	3,338	1,014	477	872	17,147	11,266	2,222	13
November	3,033	2,011	3,329	1,013	474	876	16,827	11,027	2,200	13
December	2,952	2,043	3,344	1,005	459	871	16,692	10,823	2,132	13
1921										
January	2,692	2,092	3,159	938	415	805	16,402	10,816	1,947	12
February	2,570	2,127	3,054	922	413	793	16,131	10,583	1,878	12
March	2,444	2,192	2,986	826	500	791	16,021	10,404	1,792	11
April	2,241	2,283	2,871	676	650	764	15,733	10,201	1,601	10
May	2,039	2,370	2,784	608	682	723	15,466	10,194	1,421	9
June	1,865	2,439	2,682	479	822	690	15,319	10,182	1,267	8
July	1,735	2,503	2,594	432	846	657	15,020	10,037	1,167	8
August	1,566	2,598	2,506	396	862	638	14,876	9,921	996	7
September	1,471	2,694	2,485	315	966	638	14,857	9,953	906	6
October	1,415	2,755	2,452	298	1,001	634	14,897	10,107	854	6

[a] Including rediscounts with Federal Reserve banks.